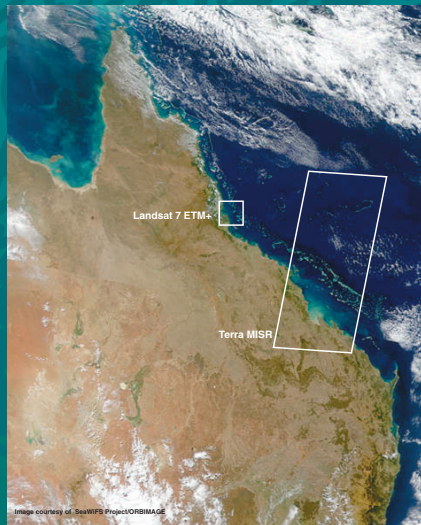


Ocean and Land... Struggling for Mastery

Darwin, The Voyage of the Beagle



OrbView-2 SeaWiFS wide-angle camera shows the entire 1,800-km-long Great Barrier Reef.

Nadir, true-color composite images locate and detail reefs, coral cays, reef passages, and coastal features. Light in the blue bands penetrates clear water and is reflected by corals and coral sand at shallow depths. Yellowish light is reflected by suspended sediment and phytoplankton that harm corals. Images display coral health and growth patterns, which are sensitive to ocean currents and turbid water. Coral changes are tropical indicators of global climatic changes.

The Great Barrier Reef Observed by EOSDIS Data

Terra MISR depicts reefs in clear ocean water, as well as near-shore features and turbid water along the Queensland coast.



Landsat 7 ETM+ reveals detailed variations in water depth and water clarity as variations in blue (yellow-blue is turbid water, light blue is shallow clear water, and dark blue is deep water).



National Aeronautics and
Space Administration

The Great Barrier Reef is a UNESCO World Heritage Area.

NASA/SeaWiFS Great Barrier Reef

Great Barrier Reef

Living coral reefs are among the most diverse and productive communities on Earth. These “Rainforests of the Sea” are a complex community of plants, animals, and microscopic organisms. Reefs are found in the warm, clear, shallow waters of tropical oceans around the world. They provide food and shelter to fish and invertebrates, and they protect the shore from wave erosion. Changes in coral health are sensitive indicators of changing environmental conditions. The health of the world’s oceans is affected, and can be assessed, by the health of coral reefs.

The ocean and the land seem here struggling for mastery: although terra firma has obtained a footing, the denizens of the water think their claim at least equally good.

– Charles Darwin, *The Voyage of the Beagle*

Although Darwin made this observation while visiting the Cocos Islands, the interplay of natural forces applies to all reefs. What has changed since Darwin’s time is the addition of a significant new player—Man. Coral reefs have been resilient ecosystems for millions of years, withstanding severe environmental events. However, this resiliency is being tested even further by the direct and indirect consequences of human activities.

Coral reefs can be killed by pollution. Human population expansion and land development alter the landscape, increasing the amount of freshwater runoff. The runoff carries large amounts of sediment from cleared land, high levels of nutrients from agricultural areas and septic systems, as well as many other pollutants. Human activities, whether for industry or sport, have been linked to a decrease in coral cover and a decline in reef health.

Map and Monitor Coral Reef Health Using EOSDIS Data

Scientific data products from NASA’s Earth Observing System (EOS) satellites allow observation and analysis of natural and human-induced environmental changes. Satellite data can be used to map and measure reefs, current patterns, and oceanic variables such as sea surface temperature. Nadir, true-color composite images depict coral health and growth patterns, which are sensitive to ocean currents and turbid water. The featured images represent only a small sample of the many EOS Data and Information System (EOSDIS) products useful in studying coral reefs.

OrbView-2 SeaWiFS. The Sea-viewing Wide Field-of-view Sensor (SeaWiFS) wide-angle camera shows the entire 1,800-km-long Great Barrier Reef in one synoptic view. A coral reef tool using SeaWiFS data is available at <http://seawifs.gsfc.nasa.gov/reefs/>. [The image was provided by the SeaWiFS Project, NASA/Goddard Space Flight Center (GSFC), and ORBIMAGE to Visible Earth (<http://visibleearth.nasa.gov/cgi-bin/viewrecord?2322>).]

Scene ID: S2000194015528.L1A_HTOW – 12 July 2000 [Spatial resolution is 1.1 km. (LAC resolution)]

Data can be ordered from the GSFC Distributed Active Archive Center (DAAC) at

http://daac.gsfc.nasa.gov/data/dataset/SEAWIFS/01_Data_Products/02_LAC/index.html

Select in turn L1A_HRPT, HTOW, 2000, July, and then Scene ID. A requestor must register as an authorized user with both the GSFC DAAC and SeaWiFS (at <http://seawifs.gsfc.nasa.gov/cgi-bin/apply.pl?page=du>).

Terra MISR. The Multi-angle Imaging SpectroRadiometer (MISR) nadir camera shows offshore coral reefs and parts of the Great Barrier Reef in clear ocean water, near-shore rocky islands and features of the Queensland coast (from Hayman Island south to Curtis Island), and coastal turbid water. (The image was provided by Dr. David J. Diner, MISR Principal Investigator, Jet Propulsion Laboratory.)

Data Set: MISR LEVEL 1B2 ELLIPSOID DATA V001 (Spatial resolution is 275 m.)

Data Granule ID: SC:MI1B2E.001:335634 – 26 August 2000, Path 92, Orbit 03679

Data can be ordered from the EOS Data Gateway (EDG) at <http://eos.nasa.gov/imswelcome>.

Landsat 7 ETM+. The Enhanced Thematic Mapper (ETM+) image reveals detailed variations in water depth and water clarity. The large island is Hinchinbrook Island. (The image was provided by Dr. Darrel Williams, Landsat Project Scientist, NASA/GSFC.)

This scene is a subset of a mosaic of two scenes: Path-Row = 95-72 and 95-73, 14 August 1999.

Data Set: LANDSAT-7 LEVEL-1 WRS-SCENE V002 (Spatial resolution is 30 m.)

Data Granule IDs: SC:L70RWRS.002.2000147280 and SC:L70RWRS.002.2000147282

Data can be ordered from the EDG at <http://eos.nasa.gov/imswelcome>.

For information about the NASA EOS missions and instruments, see the Web site at <http://eos.nasa.gov/>.

For information about the data centers that distribute EOSDIS data, see the DAAC Alliance Web site at <http://nasadaacs.eos.nasa.gov>.

The Great Barrier Reef is the largest ecosystem to be designated as a UNESCO World Heritage Area.